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forty-eight illustrations, not one represents a characteristic stone implement of this country. The little that our author finds to say under the comprehensive title of 'Prehistoric man in America' is included in twelve pages, constituting chapter vii., and is mainly a review of Squier and Davis's Ancient monuments of the Mississippi valley, with brief reference to certain discoveries recorded so long ago as the publication of Gliddon and Nott's Types of mankind. Mr. Joly might readily have done far better. No mention is made of the vast amount of material gathered within the last decade, that bears so strongly upon the vexed question of man's antiquity on this continent. The scores of publications of the Smithsonian institution, the invaluable reports of the Peabody museum, and the transactions of our learned societies generally, have been quite overlooked; and a vain attempt has been made, in lieu thereof, to bolster up the claim of antiquity of America's earliest people by reference to the mounds of the Ohio valley, many of which have recently lost their claim to a pre-Indian origin, and others, doubtless, will yet be shown to have been erected by the ancestors of our modern redskin. As a *résumé* of European archeology, it is valuable, but not otherwise. To the American students of the science it will prove disappointing.

Hydraulic tables for the calculation of the discharge through sewers, pipes, and conduits; based on Kutter's formula. By P. J. FLYNN. New York, D. Van Nostrand, 1883. (Van Nostrand's science series, no. 67.) 135 p. 24°.

KUTTER's formula for determining the velocity of flow of water is one of the class which has the general form $v = c \sqrt{rs}$, where r is the ratio of the cross-section a to the wetted pe-

rimeter, and s is the sine of the slope; but the coefficient c is of such a complex form, that the application of the formula to definite problems in water-supply and sewerage is somewhat tedious. This collection of tables is designed to facilitate the work, and gives values of r , $c\sqrt{r}$, and $ac\sqrt{r}$, for circular and egg-shaped sections, and of s and \sqrt{s} for different slopes. The coefficient of roughness or friction used is .015, and a number of examples make clear the use of the tables. Engineers who have such work in their practice will find these tables convenient.

Chemical problems, with brief statements of the principles involved. By JAMES C. FOYE. New York, Van Nostrand, 1883. (Van Nostrand science series, no. 69.) 6+141 p. 24°.

THE value of chemical problems as a practical illustration of the rules of stoichiometry is recognized by every teacher of chemistry. A thorough knowledge of chemical arithmetic is constantly required in the laboratory, and it can only be gained by actual practice in the solution of problems. The convenience of having a collection of examples at hand will therefore be appreciated by teachers; and this book will doubtless supply a deficiency to those who prefer the problems arranged independently of the text-book. A great variety of examples are presented, with very full illustrations of the relations which exist between the factors and products of chemical reactions, beside calculations of atomic and molecular weights, specific and latent heat, specific gravity and vapor density. Examples are also introduced on the metric system of weights and measures, thermometric scales, and the laws of Mariotte and Charles.

WEEKLY SUMMARY OF THE PROGRESS OF SCIENCE.

ASTRONOMY.

Origin of the lines A and B in the spectrum.—M. Egoroff, by experiments at the physical laboratory of the University of St. Petersburg, has shown that the lines of the solar spectrum known as A and B are due to the oxygen of our atmosphere. He employed a tube twenty metres in length, closed with glass plates, in which tube the gas under investigation could be condensed under pressures of fifteen atmospheres or less, proper care being taken to dry it thoroughly. The telluric character of these lines has been generally admitted, but has of late been called in question by Mr. Abney, who

suggested that they might be due to cosmical hydrocarbon gas of some kind, diffused through space in accordance with Siemens's theory. M. Egoroff sets this question at rest, having determined by direct experiment that none of several different hydrocarbons tried gives any such bands, while oxygen unmistakably does give them. — (*Comptes rendus*, Aug. 27.) C. A. Y. [327]

On the assumption of a solar electric potential.—Werner Siemens discusses the hypothesis proposed by his brother (Sir W. Siemens), that the sun has a high electric potential, due to the friction of the dissociated matter which, according to his

theory, is continually flowing in at the sun's polar regions to replace that which, after combustion, is thrown off at the sun's equator. The paper is an important one, but too long to be fairly summarized within our limits. A considerable portion of it is devoted to an endeavor to obviate one of the most serious objections to Siemens's theory of the solar heat; namely, the objection based on the resistance to planetary motions which would result from a cosmical interstellar medium of the necessary density. Werner Siemens argues that the particles of matter passing off from the sun's equator would continue to revolve around the sun as they receded from it, and at any distance would have the same velocity as a planet at that distance, and so would offer no resistance. The paper is, however, mainly occupied with the planetary consequences of solar electrification. — (*Phil. mag.*, Sept.) C. A. Y. [328]

MATHEMATICS.

Development of real functions. — The exact title of this paper, by M. J. P. Gram, is 'The development of real functions in series, by the method of least squares.' M. Gram's paper is an exceedingly interesting one, but unfortunately one which cannot be more than briefly referred to in this place, as a suitable notice of it would require the reproduction of a great deal of algebraical work. The principal problem which M. Gram proposes to solve is stated as follows: let there be given a series of arguments, x , and two corresponding series of quantities, o_x and v_x . These last quantities are all real, and, further, the v_x are all positive. Then in a series which contains known functions of x , — viz., $y_x = a_1 X_1 + a_2 X_2 + \dots + a_n X_n$, — the coefficients are to be so determined that $\sum_x v_x (o_x - y_x)^2$ shall be a minimum. In the first part of the paper, the author gives applications of his process to Fourier's series, spherical harmonics, and cylindrical functions. The second part refers almost entirely to the convergence of certain series; but without quoting much that is obtained in the first section, and defining many symbols, it would be impossible to give here a suitable or intelligible notice of this second section. — (*Journ. reine ang. math.*, xciv. 94.) T. C. [329]

ENGINEERING.

Economical pumping-engines. — Mr. C. T. Porter reports the duty of the Gaskill engines at Saratoga as 106,000,000 pounds, raised one foot high, per 100 pounds of hand-picked coal. The Corliss engines at Pettaconsett, Providence, R.I., gave a duty of 113,271,000; and the Pawtucket engines have an average, for the year 1882, of 113,500,000. The slip of valves is reduced to one-half of one per cent. — (*Mech.*, July 21.) R. H. T. [330]

Consolidation of bulky materials. — A steam-hammer has recently been applied to the consolidation of bulky materials in steel moulds. The materials are usually organic, often fibrous, and one blow generally does the work. Four blocks per minute are made; 3,000 pounds of sawdust are compacted into blocks each hour. Bran is thus made denser

than flour, and can be preserved indefinitely. Stone is made from earth or sand, and weighing 160 pounds per cubic foot. The following are results so obtained: —

	Cubic feet per ton.		Weight per cubic foot.	
	Unpressed.	Pressed.	Unpressed.	Pressed.
Bran	172	34	13	65
Meal	64	37	35	65
Sawdust	448	34	5	65
Tanbark	140	35	16	64
Cotton (baled)	93	40	—	56
Hay	160	34	14	65
Bitum. coal-dust.	44	28	50	80

— (*Industr. world*, June.) R. H. T. [331]

Economy of steam-boilers. — William Kent reports, to the American society of mechanical engineers, the results of a series of tests of fuels in various ways, and under various forms of boilers. He gives the following as relative values of fuels determined by burning under the Babcock & Wilcox boilers: —

Welsh bitum.	109.6.
Scotch bitum.	109.5.
Cambria, Penn., semi-bitum.	91.2.
Pittsburgh, Penn., bitum.	99.5.
Ohio bitum.	84.9.
Vancouver's Island	85.7.

The paper is long and unusually complete. — (*Ibid.*) R. H. T. [332]

METALLURGY.

Bessemerizing copper mattes. — Pierre Manhés claims to have overcome all the difficulties in Bessemerizing copper matte, and to have charge of an establishment which is, at the present time, successfully making copper on a commercial scale. He melts the ore in a suitable cupola furnace, casting the matte produced into a Manhés converter, when, under the action of a high-pressure blast, it is rapidly transformed into 98% to 99% black copper. The Manhés works consist of three cupolas of twenty-five to thirty tons' capacity per day; two small cupolas for remelting the matte in case of need; three Manhés converters, treating a ton and a half of matte at each operation, and each converter makes twenty-two to twenty-four operations per day; and the necessary blowing-engines. Manhés claims that cost of labor is reduced to a minimum, because operations last only a few minutes, and large quantities of metal are handled. The cost of fuel is low; because no fuel is needed to bring the matte forward to black copper, except that used for the blowing-engine. The saving in cost over the Welsh or Swansea process, according to local conditions, is from 50% to 75%. — (*Eng. min. journ.*, June 30.) R. H. R. [333]

AGRICULTURE.

Seed-testing. — Comparisons between the germinating and vegetating powers of seeds, made at the New-York agricultural experiment-station, show that the two are by no means identical. Many seeds which were capable of putting forth a radicle failed

to vegetate sufficiently to form cotyledons, under the favorable conditions of a testing-apparatus. In eleven tests, with four species of seeds, from ten to forty-six per cent of the seeds germinated, but failed to vegetate. — (*N. Y. agric. exp. stat. bull.*, lxii.) H. P. A.

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Sulphuric acid as a fertilizer.—The use of sulphuric acid has been proposed as a means of rendering the constituents of the soil soluble. Experiments by Farsky on summer rye, grown in boxes, showed no advantage from the use of sulphuric acid or of acid sodium sulphate. When the soil was kept dry, a slight decrease in the production of grain was noticed as the result of the manuring. The soil was a clay soil, and the sulphuric acid was sprinkled upon it in the concentrated form until it was distinctly moist. A hundred grams of acid were used to thirty-five hundred grams of soil. — (*Biedermann's centr.-blatt.*, xii. 447.) H. P. A.

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GEOLOGY.

Lithology.

Determination of the felspars in rocks.—Professor J. Szabó's method of determining the felspars in rocks was published at Budapesth in 1876; but he has recently placed it before the English reading public in a paper read at Montreal last year. His method consists chiefly in determining the coloration of the flame by the felspars, and their fusibility. This method, with the addition of Boricky's micro-chemical process, is further used by Szabó for the determination of other silicates. For the details of the process, reference is to be had to the original papers. — (*Proc. Amer. assoc. adv. sc.*, 1882.) M. E. W.

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Laterite from Huranbee, Pegu, India.—This is described by Dr. R. Romanis as an aqueous rock of a bright red color, friable, and full of cavities. It is stated to be composed of 31.44% of quartz sand, 13.27% of soluble silica, 36.28% of ferric oxide, 9.72% of alumina, and 8.83% of water. When the sand is examined under the microscope, it is seen to be water-worn. Laterite is much used in building and road-making on account of its hardening when exposed to the air. — (*Trans. Edinb. geol. soc.*, iv. 164.) M. E. W.

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MINERALOGY.

Minerals from Amelia county, Va.—In a vein of granite which for the past few years has been worked for mica, a few rare and interesting minerals have been found, and are described by William F. Fontaine. Columbite occurs in crystals of large size, and rather rarely a manganese variety of a chestnut-brown color is found. This latter has a tendency to assume a fibrous structure. Orthite is found abundantly in long, bladed crystals. The most interesting mineral found at the locality is microlite, occurring both in crystalline masses of large size, and in distinct crystals: the latter are octahedrons, modified by small cubic, dodecahedron, and tetragonal-trisoctahedron faces. Analysis has shown that the mineral is essentially a calcium tantalate. Monazete, another

rare and interesting mineral, is found abundantly at the locality, sometimes in masses weighing several pounds. Analyses have shown that this has the composition of a normal phosphate of the cerium metals, while the thorium, which is most always present, and abundantly in the monazete from Amelia, is due to an admixture of a silicate of thorium. Helvite, a rare silicate of manganese, beryllium, and iron, containing sulphur, is found sparingly associated with spessartite (manganese garnet). — (*Amer. journ. sc.*, May, 1883.) S. L. P.

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METEOROLOGY.

Thunder-storms.—A special investigation of thunder-storms has been made in Bavaria and Würtemberg since 1879. In 1882, in Bavaria there were 252 stations, which number, distributed uniformly, would give a mean distance between stations of about ten miles. To each of these stations, cards were sent, having questions calling for the time of beginning and ending of thunder, hail, or rain; also, the direction from which the storm came, and the direction and force of the wind.

These investigations show: 1°. That the thunder-storm, while not an accompaniment of a cyclone, still appears with smaller secondary depressions, or spurs of great depressions, which are so flat that they do not produce any strong wind. Of special force is the thunder-storm in the ridge of high pressure dividing two great depression-regions from each other. 2°. That the line upon which simultaneous electric discharges take place encloses a space which has, in most cases, great length but little width, and which stands at right angles to the line of progress of the storm. Such simultaneous discharges have been observed over a region 300 km. (186 miles) broad and about 40 km. (25 miles) deep. 3°. That special regions for thunder-storms are marshy low grounds between the Mediterranean or other smaller bodies of water, and the Alps; also the western declivity of the Bohemian forest. 4°. That in cases where the origin of the storm can be well determined, within the region of observation, it is found that electric discharges take their beginning along a long line simultaneously; and it is conjectured, that the disturbance of the electric equilibrium, by the first discharge, propagates its influence from cloud to cloud, and causes simultaneous outbursts in different places. 5°. Heat-lightning is due to the presence of a storm at a great distance. In one instance it was traced to a storm 270 km. (167 miles) distant. 6°. Arranging the storms according to their frequency at each hour of the day, we find the hours from midnight to eight A. M. of little activity, a very rapid rise from eight A. M. to four P. M., and nearly as rapid a fall to midnight.

The above results show the importance of a detailed observance of these meteors. It is hardly probable that we can learn particulars of these so-called local storms, by observing them at stations a hundred or more miles apart. The various state weather-services have an excellent opportunity for undertaking such observations. It may be possible to learn the movements of these storms over large areas, and thus to

give warning of their approach three or even four hours in advance. — (*Zeitschr. met.*, June.) H. A. H. [339]

GEOGRAPHY.

Bureau of commercial science. — The Ministry of commerce in France has just instituted a new bureau, which is to be directed by M. Renard, formerly librarian of the Ministry of marine. This bureau is intended to bring together the publications, letters, travels, and information bearing on commerce, industry in foreign countries, navigation, etc., which come to the authorities in various ways, and selections and translations of documents from foreign sources and collections. Those considered of importance will be printed for the public use. — (*Soc. de géogr. Paris*, June.) W. H. D. [340]

Notes on population. — The late census of Monaco shows the principality to contain 9,108 inhabitants, of which more than one-third are French. — Born Parisians are always in a minority in that city, numbering, according to the latest figures, about thirty-two per cent of the population. The city contains 164,038 foreigners, of which, in round numbers, 45,000 are Belgians, 31,200 Germans, 21,600 Italians, 21,000 Swiss, 10,800 English, 9,250 Dutch, and about 5,000 each, Americans, Russians, and Austrians. Twenty per cent of the total increase of the population of Paris during the years 1876-81 is due to the increase of resident foreigners. — The stagnation of the population of France is exciting much attention, and even apprehension. It is sufficiently evinced by its proportional ratio to the Anglo-Germanic population of Europe. This in 1700 was three to three, or fifty per cent; that is to say, France equalled in population the whole of the group referred to. In 1881, however, her ratio was as three to seventeen; or, if the Anglo-Germans of the United States be counted in, it was only three to thirty, or about ten per cent. — The population native to the Marquesas Islands in 1855 was about 12,000: at present it has diminished to 5,700. — The population of Tunis, it seems, has been greatly exaggerated. Instead of five or even two and a half million, as has been accepted for some years, the late investigations of M. Perpetue show that the total figure, probably, should not exceed 1,400,000, of which about 36,000 are foreigners. — (*Bull. soc. géogr. Mars.*, June.) W. H. D. [341]

(North America.)

Fisheries of British Columbia. — Foreign vessels have been officially warned from taking or curing fish within three miles of the coast of the province. The value of the catch for 1882 was \$1,842,675, and of vessels, nets, etc., \$229,600. Twenty canneries and other land-stations are assessed at \$402,000. They employed, in 1882, 5,215 hands and 79 vessels; and the increase in value, over 1881, of the product, was over thirty per cent. More than twelve million cans of salmon and nearly six hundred thousand pounds of herring were put up during the season. — W. H. D. [342]

Salmon-fisheries in the north-west. — The out-

put of canned salmon on the Columbia River, at the close of the season, was 629,438 cases, and the disbursements to the fishermen employed were \$1,550,000. In 1882, 541,300 cases were put up on the Columbia. About 17,500 cases had been put up on the Fraser River to Aug. 1; but, for the complete returns, details for this and the Alaskan region are not yet received. The total pack on all rivers on the north-west coast of America, in 1882, was 941,187 cases, each containing the equivalent of forty-eight pounds of canned fish, or at least double that amount of fresh fish, equal to about five million individual salmon of ten pounds each. — W. H. D. [343]

(South America.)

Notes. — C. de Amezaga, in the Bulletin of the Italian geographical society, gives a general description of the Galapagos, with a map, from investigations by Wolf and Icaza, and an historical account of them, and the endeavors to colonize them. It appears that there is actually a small settlement on Chatham Island of recent date. Older ones on Florian all came to an unfortunate termination. — The Instituto Argentino meditates an expedition to southern Patagonia, to be directed by Capt. Carlo Moyano, who lately crossed the Patagonian desert from Santa Cruz to Port Deseado. — The death of Bartolomeo Lucio is reported on the 9th of June, while on his way from Lisbon to Para. The deceased, who was about fifty years of age, had been a civil and military officer in the Peruvian service, but was afterward more distinguished as an explorer of the Ucayali and upper Amazons, and as the collector of a precious ethnological exhibit now in the Ethnological museum at Rome, relating to the inhabitants of this region. — The commission for determining the boundary between Venezuela and Brazil, in the vicinity of the Orinoco, has returned to Rio Janeiro. They bring valuable geographical material, but have suffered severely from fever and other evils attendant on such explorations in South America. — Lovisato, one of Bove's companions, has read a paper before the Italian geographical society on his geological researches in Patagonia and Tierra del Fuego, describing the glaciers of the latter region, and suggesting reasons for the supposition that the antarctic region is occupied by land rather than sea. — Some notes on New Grenada, made in 1617-30 by Hubert Verdonck, a Belgian Jesuit, appear in the Anvers Bulletin. They contain a few ethnological and historical details of interest; but even at that time the aborigines had totally disappeared from the vicinity of Carthagena and Panama. — A letter from the French meteorological station at Orange Harbor, in the *Revue géographique* for July, while containing no information of importance, is accompanied by two characteristic illustrations of Fuegian people, and one of their dogs. — W. H. D. [344]

BOTANY.

Sylloge fungorum. — The second volume by Prof. P. A. Saccardo, of more than eight hundred pages, includes all the remaining species of Pyre-

nomycetes not treated in the first volume, together with an index of all the genera and species of the order. There are also several pages of addenda to both volumes, including the species published up to a very recent date. In fulness and general arrangement, the present volume has the same merits as its predecessor. Vol. iii. is announced to appear in 1884, and will include the Sphaeropsoidae, Melanconiceae, and Hyphomycetes. — W. G. F. [345]

Illustrations of British fungi.—This comprehensive and finely executed work by M. C. Cooke has now reached the end of the second volume, including eighteen parts and an index. The two volumes already issued include figures of all the leucosporic species of *Agaricus* known to occur in Britain, except twenty-six little-known species, three hundred and seventy-eight species with varieties being represented—a considerably larger number than is included in the works of Sowerby, Bulliard, or Krombholz. The work will be continued, and contain plates of the remaining sections of *Agaricus*. — W. G. F. [346]

Ascospores in the genus *Saccharomyces*.—In the reports of the Carlsberg laboratory, Hansen gives a *résumé* of his researches on the formation of ascospores in the different forms of *Saccharomyces*. While in general he agrees with Rees's views, he denies the possibility of distinguishing species of *Saccharomyces* by the ascospores; and, in fact, he is hardly inclined to admit the specific value of the different forms described by Rees. Hansen's experiments were made with cultures of single spores obtained by a process of dilution, which he describes in detail; and the purity of the cultures was recognized by the formation, on the walls of the culture-flasks, of a single spot formed from the growth of one spore. He also adopted, with good results, Koch's method of gelatine culture. While the ascospores of the different so-called species of *Saccharomyces* cannot be distinguished by their shape, Hansen found that there was a difference in the time of their germination when exposed to different temperatures; and he gives a series of curves to represent the results of his experiments with regard to the temperature in six different forms. The curves all have a similar form; but the maxima and minima vary with the different species, the minimum being between $\frac{1}{2}^{\circ}$ C. and 3° C., and the maximum about $37\frac{1}{2}^{\circ}$ C. There follows a discussion of what Pasteur calls *Torulæ*, which resemble species of *Saccharomyces*, but are separated from that genus by Hansen, because he found that they did not produce ascospores. The paper concludes with an account of diseases of beer caused by certain alcoholic ferments. — W. G. F. [347]

ZOOLOGY.

Worms.

Homology of the nemertean proboscis and the chorda dorsalis.—In an article on the ancestral form of the chordata, Hubrecht defends the following speculative thesis: "According to my opinion, the proboscis of the nemerteans, which arises as an invaginable structure (entirely derived, both phylo- and onto-genetically, from the epiblast), and

which passes through a part of the cerebral ganglion, is homologous with the rudimentary organ, which is found in the whole series of vertebrates without exception,—the hypophysis cerebri. The proboscidean sheath is comparable in situation (and development?) with the chorda dorsalis of vertebrates." Without adding new facts, but merely basing his arguments on what is already known, the author defends his hypothesis with great ingenuity. His chief argument is, that the proboscis and the hypophysis are both anterior ectodermal invaginations, and are homologous. His use of terms is misleading. By 'proboscis' he designates apparently both the free portion of the proboscis and its sheath; by 'proboscidean sheath,' on the contrary, the posterior portion of the proboscis, which has no sheath, and is not free. At least, his descriptions became intelligible to the reporter only on that assumption. The posterior unfree part of the proboscis he considers the homologue of the notochord. The vertebrates are not connected with the annelids; but, on the contrary, the two lateral nerves of lower worms have united *dorsally* to make the central nervous system of vertebrates, *ventrally* to form the ganglionic chain of annelids and their derivatives. In the second half of his paper, the author endeavors to strengthen his position by comparisons between other organs in nemerteans and vertebrates. [It is possible that Hubrecht's hypothesis will be verified; but the objections to it come to mind so immediately, and in such throngs, that it is difficult to believe the hypothesis well founded. Some of the most serious objections are ably presented by Whitman in an article accidentally published in the same number (p. 376), and arguing in favor of the annelidan affinities of vertebrates.] — (*Quart. journ. micr. sc.*, xxiii. 349.) C. S. M. [348]

Embryology of *Planaria polychroa*.—Metschnikoff has studied the development of fresh-water planarians, and reached conclusions that are, in part, very startling. *Pl. polychroa* lays its egg-capsules in late spring and early summer. Each capsule contains from four to six eggs, and thousands of the so-called 'yolk-cells.' The egg has no membrane. The yolk-cells immediately around each ovum break down, their membranes disappear; but their nuclei remain for a long time distinguishable, although they finally disappear in the embryo, into the composition of which these disintegrated cells enter. The ovum segments, but the cleavage-cells do not cohere, there being no vitelline membrane: on the contrary, each embeds itself in the mass derived from the yolk-cells. In some manner, which is left in complete obscurity by the author's descriptions, the cells from the ovum gradually spread themselves, and form first the pharynx, and then an epidermal layer of thin cells, which encloses the whole of the disintegrated yolk-mass, together with cells from the ovum, embedded in it. In the centre of this mixed parenchyma appears a cavity which communicates with the lumen of the pharynx. This last seizes and swallows the surrounding yolk-cells, each intact. The cells scattered through the body form the mesoderm (mes-

enchym), which arranges itself so as to form the partitions of the body, dividing the disintegrated yolk-mass into separate accumulations, which, combining with the yolk-cells swallowed, gradually assume the form of the intestine with its coeca. No entoderm exists, unless two cells at the base of the proboscis are a remnant of it. During these changes the nervous system appears, and the sheath around the proboscis is developed. Metschnikoff advances the opinion, that the yolk-cells swallowed, though not derived from the ovum, and being foreign bodies, nevertheless become the cells of the apparent entoderm of the adult. He further believes that the nervous system is derived from the mesoderm. If Metschnikoff is correct in maintaining, that, *first*, there are no epithelial germ-layers; *second*, the cleavage-cells are mixed with and embedded in a foreign substance; *third*, foreign cells form the entoderm, there being no embryonic entoderm; *fourth*, the nervous system is derived from the mesoderm, — then it is obvious that the general conclusions which we are wont to consider to have been well established by embryological research are erroneous, although they rest upon a vast body of evidence. One would suppose that no attempt to set this evidence aside would be made, except after the most unquestionable determination of new facts. Now, Metschnikoff's researches leave every one of the processes involved in his novel views in absolute darkness; for he has not, for the most part, observed them at all. His surprising deductions are based upon a failure to ascertain what are the actual processes, and seem to the reporter invalid. The value of the real observations is, of course, unaffected by the speculative portions of the essay. — (*Zeitsch. wiss. zool.*, xxxviii. 331.) C. S. M. [349]

Insects.

Epidermal glands of caterpillars and Malachius. — The following are the principal results obtained by Stan. Klemensiewicz. 1°. The eighth and ninth segments of the larvae of *Liparis*, *Leucoma*, *Orgyia*, and *Porthesia auriflua*, have each a little protuberance on the median dorsal line, with the opening of a gland at the summit. The secretion is clear and odorless. The skin is invaginated at the top of the papilla to form a pendent sack, at the base of which are inserted two muscles running obliquely backwards; and there also open two glands by a common duct. The external surface of the glands is smooth, but in their interior each gland-cell forms a separate bulging mass: the appearance thus presented is singular. The lumen of the duct is very small; its thick walls are formed by two large cells, much like those of the gland proper. In *Leucoma salicis* there are quite similar glands on the fourth and fifth segments. 2°. The exsertile horns of *Papilio Machaon*, larva, are described. They are really developments of the tegument: the epidermal cells of their walls are large, and contain numerous rod-shaped bodies; but the cells at the base of the horns are much smaller, and glandular (their secretion being probably discharged through pores of the adjacent cuticula). It may be assumed, that the

odororous secretion accumulates in the invaginated horns, and is freed by their exertion. 3°. The caterpillar of *Harpyia vinula* has a gland in the first segment, opening ventrally. The gland is flask-shaped, the neck acting as duct, and opening into a large transverse fissure; the body of the flask is the gland proper, and is lined by polygonal epithelial cells, with irregularly shaped nuclei; the epithelium rests upon a thin tunica propria. 4°. A similar organ to the last mentioned was described in *Vanessa* larvae, by Rogenhofer (*Verh. zool.-bot. ges. Wien*, xii. 1227): it is an invagination of the skin on the ventral side of the first segment; its cuticula is thin, and forms numerous little cups, under each of which is a thin epithelial cell. 5°. The orange-colored fleshy warts on the sides of the thorax and abdomen of *Malachius* are also glandular. The epidermis presents no special features in the warts, except that it bears scattered unicellular glands of the form typical for insects; they are flask-shaped, with a coiled cuticular duct in their interior, the duct being continuous with a pore-canal through the general cuticula of the wart. In the lower and larger end of each cell, lies the round nucleus. — (*Verh. zool.-bot. ges. Wien*, xxxii. 459.) C. S. M. [350]

ANTHROPOLOGY.

Prehistoric copper. — Professor J. D. Butler confidently asserts that the Wisconsin state historical society's collection contains more American aboriginal copper implements than he has been able to hear of in all other cabinets whatever. One axe weighs four pounds twelve ounces and a quarter, and is the heaviest article of wrought copper as yet brought to light. Fourteen new implements have lately been added, some of them unique in form, or size, or in the location from which they were derived. More than fifty coppers have come to the cabinet from Washington county alone. This fact is doubtless due to Mr. Perkins's persistent search in that locality. — (*Wisc. hist. coll.*, ix. 97.) J. W. P. [351]

Aztalan. — The largest and most elaborate aboriginal monument in Wisconsin is Aztalan, fifty miles east of Madison. It was first discovered by Timothy Johnson in 1836, and described by Nathaniel F. Hyer in the *Milwaukee advertiser*, January, 1837. Mr. Stephen Taylor gave an illustrated account of it in *Silliman's journal* in 1843; and the place was first accurately surveyed and plotted by Dr. Lapham, in 1850, whose description and drawings were published in 1855, in the Smithsonian contributions to knowledge. "This strange monument," says Prof. Butler, "was styled Aztalan by Mr. Hyer, inasmuch as it seemed to him a structure worthy of the Aztecs." Upon this point Mr. Peet says, "The name Aztalan was derived from a tradition, which was said to be common among the Indians, that a people partially civilized built here a city, and a hundred years afterward, becoming dissatisfied, proceeded south to Mexico." There is no reason to suppose that the Aztecs, or any other Mexican people, were in any way connected with it. Much curiosity has been excited with reference to the Aztalan bricks, which are shapeless

clods of clay, burnt red and pretty hard. The process of burning is supposed to have been similar to that discovered by Schliemann at Troy. The soil, a sort of loam, had been thrown up into a rampart, the whole coated with clay matted together with bushes and sedge. Over all were heaped prairie-grass and trees, and the pile set on fire. Dr. Yarrow describes a like process pursued in North Carolina grave-mounds. — (*Wisc. hist. coll.*, ix. 99.) J. W. P. [352]

EARLY INSTITUTIONS.

History of agricultural prices in England. — M. Jusserand reviews Mr. Thorold Rogers's work upon this subject. He pronounces it one of the great books of our century, and indispensable to the student of economic history. It is full of facts hitherto unknown, or, if known, unclassified, and inaccessible to most students. Mr. Rogers's opinion that the fifteenth century, and the beginning of the sixteenth, was a golden age for the laboring-people of England, is cited as especially notable, inasmuch as a contrary opinion has generally obtained up to this time. — (*Rev. critique*, 18 juin, 1883.) D. W. R. [353]

Indirect taxation among the Romans. — M. Dareste sums up all, or nearly all, that is known upon this subject. Very little is known; and very little is

likely to be known, unless some more inscriptions, like that discovered not long ago in the ruins of Palmyra, should be found. It was an important find, — a custom-house tariff with regulations regarding the collection of duties. (See *Bull. corresp. hellén.*, mai-juin, 1882.) The inscription has not yet been published. The principal indirect taxes of the Romans were, the custom-house duty (portorium), a tax on successions, upon the manumission of slaves, and the sale of movable goods. They were not very heavy taxes at any time. M. Dareste gives us a very good account of the portorium. The Roman custom-houses were scattered about here and there, wherever merchants were wont to pass or to congregate. A list of localities where there were custom-houses is given. The portorium was a percentage levied upon the value of merchandise. Only merchandise was subject to it. Personal effects of travellers, *instrumenta itineris*, etc., were free of duty. A list of writings upon the subject is given. The principal work cited is that of M. R. Cagnat: *Étude historique sur les impôts indirects chez les Romains*. It was written before the discovery of the Palmyra inscription. — (*Séances trav. acad. inscr.*, Feb.-March, 1883.) D. W. R. [354]

INTELLIGENCE FROM AMERICAN SCIENTIFIC STATIONS.

GOVERNMENT ORGANIZATIONS.

Geological survey.

Field-work of the division of the Great Basin. — In consequence of the extension of the work of the survey to the Atlantic states, the director has found it necessary to divert some of its force from investigations already initiated. One of the most important researches thus stopped is that of the quaternary lakes of the Great Basin. The corps was reduced at the beginning of the fiscal year, and instructed to devote the field season to supplementing the material already acquired, so as to prepare it for publication without future visits to the district.

The office at Salt-Lake City was closed on the 30th of June, and field operations were immediately begun. Mr. I. C. Russell, assistant geologist, proceeded to Mono valley, California, and carried to completion his examination of the existing lake and its ancient expansion. He included in his study, also, the six extinct glaciers which anciently debouched in the Mono valley, tracing them to their common source in the great névé of the Sierra Nevada. Incidentally he examined the ice-masses associated with some of the summits of the Sierra, and brought the camera to bear on them. These have been called glaciers by Muir and others, but are said by King to be unworthy of the name; and it may be hoped that these later observations and illustrations will suffice to place the matter beyond controversy.

From the Mono basin he proceeded to the Walker,

Carson, Pyramid, Winnemucca, and Black Rock basins, for the purpose of re-investigating certain points connected with the history of the ancient Lake Lahontan, upon which he is preparing a report.

Mr. W. D. Johnson, topographer of the division, spent the summer, under Mr. Russell's direction, in surveys for a general map of the Mono basin, and is now engaged on a series of special maps of ancient glacial moraines.

Ensign J. B. Bernadou, detailed from the navy for the purpose, has acted during the summer as Mr. Russell's assistant.

Mr. G. K. Gilbert, who has general charge of the work, spent a few weeks in the field, visiting localities of special interest in the Lahontan, Bonneville, and Mono basins. He was accompanied in the Lahontan basin by Mr. R. Ellsworth Call, the conchologist, who is engaged in a study of the molluscan faunas of the quaternary lakes of the Great Basin, and took the field for the purpose of familiarizing himself with their geological relations.

The Champlain valley. — Mr. Charles D. Walcott, with Mr. C. Curtice as assistant, has been studying the formations between the archæan and Trenton in Saratoga county, N.Y., and along up the Champlain valley on both sides of the lake.

Saratoga village, west of the fault-line along which the springs occur, was found to be built over a massive, gray, magnesian limestone, that carries a strongly marked fauna closely allied to that of the Potsdam sandstone of Wisconsin. The geologic section from